We estimate in the past but implement policies in the future.

Dynamic policy effects require future-oriented causal inference.

Historical Data
Estimated ATT based on past policy adoption

→

Decision Now
Policy recommendations today

→

Future outcomes
Future estimands: future ATT or future ATE

Definitions: ATT = Average treatment effect on the treated
ATE = Average treatment effect

Keywords: Causal inference · Dynamic firearm policy effects · External validity

RAND

Overcoming the Streetlight Effect: The Role of Time Heterogeneity in Estimating Firearm Policy Effects

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Firearm policies change, and their effects may change, too

- Quantitative studies estimate policy effects on **historical data**
- Public behavior, enforcement, and attitudes shift over time
- Policy effects may therefore change over time
- Studies of right-to-carry laws suggests effects may differ by time of adoption
- Recent difference-in-differences literature stresses dynamic effects

How can estimates on yesterday's data inform policy decisions today if policy effects are always changing?

Two paths forward for quantitative analysis of firearm policies

Take dynamic policy effects less seriously

- Assume policy effects do not change over time (homogeneity)
- Past data identifies future impact
- More statistical efficiency, but may not be plausible

Either path translates historical data into insights relevant to future policy decisions

Take dynamic policy effects more seriously

- Explicitly model change in policy effects over time
- Extrapolate historical effects to present day
- Acknowledge additional variability due to extrapolation
- Example: policy effects may wane as people adapt

Analysis of right-to- carry policies in CDC WONDER mortality data, 2001-2022

- Policy data come from RAND State Firearm Law Database
- Dynamic group-time ATT estimates obtained using the `did` package in R
- Taking dynamic effects *more* seriously: projecting group-specific effects to 2025
- Taking dynamic effects *less* seriously: assuming constant group-specific effects
- Influence functions may be used to obtain estimates of variability (not shown)